

REMARKS

This is a full and timely response to the non-final Official Action mailed **July 23, 2008** (the “Office Action” or “Action”). Reconsideration of the application in light of the above amendments and the following remarks is respectfully requested.

Claim Status:

By the forgoing amendment, various claims have been amended. Further, original claim 14 has been cancelled without prejudice or disclaimer. Thus, claims 12, 13, 15-18, and 25-37 are currently pending for further action.

Rejections under 35 U.S.C. §102(b):Rajendran

Claims 12-14, 25-32, and 37 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,981,097 to Rajendran (hereinafter Rajendran). For at least the following reasons, this rejection should be reconsidered and withdrawn.

Claim 12:

Claim 12 recites:

A flex-based fuel cell, comprising:

 a first flexible circuit; comprising:

 a first flexible substrate, and

 a porous layer, wherein the porous layer comprises a plurality of pores oriented to distribute fuel to a catalyst using a capillary action; and

 a second flexible circuit adjacent the first flexible substrate circuit, wherein the first and the second flexible circuits are conformable to a substantially non-planar shape, and

wherein the first and the second flexible circuits form a channel between the first and second flexible circuits containing deionized water.

(Emphasis added).

Support for the amendment to claim 12 can be found in Applicant's originally filed specification at, for example, page 6, lines 25-29.

In contrast, Rajendran utterly fails to teach or suggest a channel between a first flexible circuit and a second flexible circuit containing deionized water. In fact, Rajendran teaches no cavities or channels whatsoever between the various layers that comprise the fuel cell. (*Rajendran*, col. 7, l. 24 through col. 8, l. 16).

"A claim is anticipated [under 35 U.S.C. § 102] only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). See M.P.E.P. § 2131. Therefore, for at least the reasons explained here, the rejection based on Rajendran of claim 12 and its dependent claims should be reconsidered and withdrawn.

Claim 27:

Claim 27 recites:

A fuel cell having first and second flexible circuits comprising:

a first flexible substrate comprising an anode;

a porous layer at said anode having pores for distributing fuel to said anode using capillary action;

a catalyst disposed on said porous layer; and

a second flexible substrate comprising a cathode.

(Emphasis added).

In contrast, Rajendran utterly fails to teach or suggest a fuel cell assembly configured to be flexible. The Examiner stated that "[t]he two circuits [of Rajendran] are flexible because the materials making up the same are flexible." (*Action*, p. 3). However, Rajendran simply teaches that:

The catalyst layers 22 and 30 may be made from well-known electrically conductive, catalytically active particles or materials and may be made by methods well known in the art. When the current collectors are carbon paper, the catalyst layers 22 and 30 may be formed on the carbon papers. (*Rajendran, col. 8, ll. 5-8*).

Figure 1 of the Rajendran drawings depicts a fuel cell stack configuration, and depicts both the anode and cathode current collectors (elements 16 and 18) and the catalyst layers (22 and 30) as being composed of a metallic, rigid material. (*Rajendran, Fig. 1*). Further, Rajendran specifically states that “[t]he laminates are made by *stacking* films of the polymer in sulfonyl fluoride form and hand rolling so that no air bubbles or moisture are trapped between the layers.” (*Rajendran, col. 9, ll. 7-9*) (emphasis added).

The substrates in the fuel cell of claim 27, however, are configured to be shaped or “flex” in non-planar shapes. (*Applicant’s Specification, p. 7, ll. 8-14*). Rajendran utterly fails to teach or suggest a fuel cell assembly comprising flexible substrates as claimed.

Additionally, Rajendran fails to teach or suggest a porous layer at an anode “having pores for distributing fuel to said anode *using capillary action*.” (Claim 27) (emphasis added). Rajendran simply teaches “catalyst layers 22 and 30 formed on the membrane should be porous so that they are readily permeable to the gases/liquids which are consumed and produced in cell.” (*Rajendran, col. 8, ll. 35-37*). However, Rajendran fails to teach capillary action occurring within the porous material.

In contrast, the present application states that capillary action depends on the fact that a liquid near a solid wall will undergo curvature of the liquid surface, and that the rate of capillary action may be controlled by adjusting the pore size (diameter) of pores in the porous metal and catalytic layers. (*Applicant’s Specification, p. 6, ll. 6-8 and p. 7, ll. 28-29*). In contrast, Rajendran fails to teach or suggest the use of capillary action in distributing fuel to said anode.

“A claim is anticipated [under 35 U.S.C. § 102] only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). See M.P.E.P. § 2131. Therefore, for at least the reasons explained here, the rejection based on Rajendran of claim 27 and its dependent claims should be reconsidered and withdrawn.

Steyn

Alternatively, Claims 12, 13, and 15-17 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,007,932 to Steyn (hereinafter Steyn). For at least the following reasons, this rejection should be reconsidered and withdrawn.

Claim 12:

As stated above, Claim 12 recites:

A flex-based fuel cell, comprising:

 a first flexible circuit; comprising:

 a first flexible substrate, and

 a porous layer, wherein the porous layer comprises a plurality of pores oriented to distribute fuel to a catalyst using a capillary action; and

 a second flexible circuit adjacent the first flexible substrate circuit, wherein the first and the second flexible circuits are conformable to a substantially non-planar shape, and

wherein the first and the second flexible circuits form a channel between the first and second flexible circuits containing deionized water.

(Emphasis added).

In contrast, Steyn utterly fails to teach or suggest a channel between a first flexible circuit and a second flexible circuit containing deionized water.

“A claim is anticipated [under 35 U.S.C. § 102] only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art

reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). See M.P.E.P. § 2131. Therefore, for at least the reasons explained here, the rejection based on Steyn of claim 12 and its dependent claims should be reconsidered and withdrawn.

Rejections under 35 U.S.C. §103(a):

In the recent Office Action, claims 15-18, and 33-36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Rajendran in view of Steyn, and in further view of U.S. Patent No. 6,197,145 to Todd et al. (hereinafter Todd). This rejection should be reconsidered and withdrawn for at least the same reasons given above in favor of the patentability of independent claims 12 and 27, respectively. Further, with respect to the specific claims enumerated below, for at least the following reasons, this rejection should be reconsidered and withdrawn.

Claim 18:

Claim 18 recites:

The flex-based fuel cell of claim 12, further comprising a *dry film adhesive* disposed between the first flexible substrate and a second flexible substrate which is part of the second flexible circuit.
(Emphasis added).

In contrast, Todd utterly fails to teach or suggest a dry film adhesive. Todd generally teaches “a method of attaching a flexible plastic film having electronic circuit traces to a rigid plastic substrate.” (*Todd, Abstract*). Specifically, Todd discloses the use of a heat activated adhesive in attaching these two elements. (*Todd, Abstract and col. 2, l. 61 through col. 3,*

l.1). However, Todd does not teach or suggest a *dry film adhesive* used to *separate* portions of the fuel cell as claimed.

Under the analysis required by *Graham v. John Deere*, 383 U.S. 1 (1966) to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Rajendran, Steyn, and Todd did not include the claimed subject matter, particularly a dry film adhesive.

The differences between the cited prior art and the claimed subject matter are significant because the adhesive of the present application is an entirely different type of adhesive that is used in an entirely different manner and in an entirely different environment. Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a rejection of claim 18 under 35 U.S.C. § 103 and *Graham*.

Conclusion:

In view of the foregoing arguments, all claims are believed to be in condition for allowance over the prior art of record. Therefore, this response is believed to be a complete response to the Office Action. However, Applicant reserves the right to set forth further arguments in future papers supporting the patentability of any of the claims, including the separate patentability of the dependent claims not explicitly addressed herein. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed.

The absence of a reply to a specific rejection, issue or comment in the Office Action does not signify agreement with or concession of that rejection, issue or comment. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment. Further, for any instances in which the Examiner took Official Notice in the Office Action, Applicants expressly do not acquiesce to the taking of Official Notice, and respectfully request that the Examiner provide an affidavit to support the Official Notice taken in the next Office Action, as required by 37 CFR 1.104(d)(2) and MPEP § 2144.03.

If the Examiner has any comments or suggestions which could place this application in better form, the Examiner is requested to telephone the undersigned attorney at the number listed below.

Respectfully submitted,

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